Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

November 3, 2015

Mr. Edward DaSilva
TPI Composites, Inc.
373 Market Street
Warren, RI 02885

RE: FALL RIVER
Transmittal No.: X266905
Application No.: SE-15-019
Class: *SM80-7*
FMF No.: 514270
AIR QUALITY PLAN APPROVAL

Dear Mr. DaSilva:

The Massachusetts Department of Environmental Protection ("MassDEP"), Bureau of Air and Waste, has reviewed your Limited Plan Application ("Application") listed above. This Application concerns the proposed modification of existing approval No. 4P10025 regarding an additional composites molding process at your wind turbine blade and other composite material parts manufacturing facility located at 69 Water Street in Fall River, Massachusetts ("Facility").

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control," regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-J, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP's review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator ("Permittee") must comply in order for the Facility to be operated in compliance with this Plan Approval.

1. DESCRIPTION OF FACILITY AND APPLICATION

TPI Composites, Inc. operates a composites manufacturing facility in 34,000 square feet of industrial space located within the Borden and Remington industrial complex (Building #2) at 69 Water Street in the city of Fall River, Massachusetts. The facility currently produces epoxy and fiber reinforced parts for the wind, transportation, and other industries, and is best described as a specialty job shop engaged in reinforced plastic composite fabrication. This application was submitted to include an additional emission factor for Light Resin Transfer Molding (LRTM), a closed molding process that was not previously listed in the previously approved Limited Plan Application (LPA) No. 4P10025. Operations at the facility consist of:

- epoxy part production using epoxy primer, polyurethane coatings, thinners, and developmental epoxy-related activities;
- polyurethane and fiber reinforced molding processes using solvents, resins in both closed and open molding, gelcoat open molding, and catalyst use;
- use of paints and adhesives; and
- use of developmental paints and adhesives.

The TPI Composites facility is an area source of Hazardous Air Pollutants (HAP) as listed in the 1990 Clean Air Act (CAA) Amendments, Section 112(b). The facility is currently operating in accordance with Plan Approval No. 4P10025. Emissions from manufacturing operations are primarily Volatile Organic Compounds (VOC), Hazardous Air Pollutants (HAP) and Acetone, a Non-Criteria Pollutant. Ancillary operations include trimming, drilling, and sanding of manufactured parts within the facility. Particulate Matter (PM) from trimming, drilling, and sanding operations is not discharged to ambient air. The processes approved in LPA No. 4P10025 are being included in this approval letter and the Approval letter issued on November 16, 2010 is hereby superseded. Best Available Control Technology (BACT) is defined in Table 2.

2. EMISSION UNIT (EU) IDENTIFICATION

Each Emission Unit (EU) identified in Table 1 is subject to and regulated by this Plan Approval:

Table 1

EU#	Description	Design Capacity	Pollution Control Device (PCD)
1	Composites Production (Note 1)	Varies by product	None
2	Gel Coat Application	N/A	HVLP spray guns or equivalent (Note 2)
3	Adhesive, Surface Preparation, Coating operations	N/A	
4	Cleaning Operations	N/A	None

Table 1 Notes:
Note 1: Consists of Epoxy Production, Open molding, Closed Molding (SCRIMP™), Closed Molding (LRTM). See Table 6, special condition 1.
Note 2: Coating and adhesives may be hand applied by rolling.

Table 1 Key:
EU# = Emission Unit Number
HVLP = High Volume, Low Pressure
LRTM = Light Resin Transfer Molding
N/A = not applicable
PCD = Pollution Control Device
SCRIMP™ = Seemann Composites Resin Infusion Molding Process

3. APPLICABLE REQUIREMENTS

A. OPERATIONAL, PRODUCTION and EMISSION LIMITS

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Table 2 below:

Table 2

EU#	Operational / Production Limit	Air Contaminant	Emission Limit
1, 2, 3, 4	1. See Table 6, special condition No. 1, No. 2 and No. 3.	VOC	4.0 TPM
			9.8 TPY (Note 1)
		HAP	4.0 TPM
			9.8 TPY (Note 1)
4	2. Acetone use shall not exceed 8,000 pounds per month.	Acetone	4.0 TPM
	3. Acetone use shall not exceed 19,600 pounds per consecutive 12-month period.		9.8 TPY

Table 2 Notes:
Note 1: The Permittee shall limit VOC and HAP emissions from "Developmental epoxy related materials" and "Developmental paints and adhesives" to no than 1.0 ton per month and 1.0 ton per consecutive 12-month period, per category inclusive to the above stated consecutive 12-month period emission limit.

Table 2 Key:
EU# = Emission Unit Number
No. = number
HAP = total combined Hazardous Air Pollutants
TPM = tons per month
TPY = tons per consecutive12-month period
VOC = Volatile Organic Compounds

B. COMPLIANCE DEMONSTRATION

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 3, 4, and 5 below:

Table 3

EU#	Monitoring and Testing Requirements
1	1. The Permittee shall monitor the pounds of VOC and/or HAP as used in composites production each month.
	2. The Permittee shall monitor the pounds of resin as used in composites production each month.
2	3. The Permittee shall monitor the pounds of VOC and/or HAP as used in gelcoat operations each month.
3	4. The Permittee shall monitor the pounds of VOC and/or HAP as used in Adhesive, Surface Preparation, Coating operations each month.
4	5. The Permittee shall monitor the pounds of Acetone as used in cleaning operations each month.
	6. The Permittee shall monitor the pounds of any VOC and/or HAP as used in cleaning operations each month.
Facility-wide	7. The Permittee shall monitor all operations to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	8. If and when MassDEP requires it, the Permittee shall conduct emission testing in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13

Table 3 Key:
CMR = Code of Massachusetts Regulations
EU# = Emission Unit Number
HAP = total combined Hazardous Air Pollutants
MassDEP = tons per month
TPY = tons per consecutive12-month period
VOC = Volatile Organic Compounds

Table 4

EU#	Record Keeping Requirements
1	1. The Permittee shall maintain a record of materials used each month, to include pounds of resin and styrene content (by weight) of resin used, in the Resin-infusion, SCRIMP™ closed molding process.
	2. The Permittee shall maintain a record of materials used each month, to include pounds of resin and styrene content (by weight) of resin used, in the LRTM closed molding process.
	3. The Permittee shall maintain a record of epoxy production materials used each month.

Table 4	
EU#	**Record Keeping Requirements**
	4. The Permittee shall maintain a record of materials used each month, to include pounds of resin and styrene content (by weight) of resin used, in the open molding process.
2	5. The Permittee shall maintain a monthly record of gelcoats used.
3	6. The Permittee shall maintain a monthly record of adhesives, sealants and coatings used.
1, 2, 3	7. The Permittee shall maintain monthly and annual emissions records calculated using the methodology detailed in Table 6, Special Terms and Conditions, provision No. 1 and provision No. 2.
	8. The Permittee shall maintain a record (e.g. Manufacturer's formulation data, Material Safety Data Sheet, etc.) of each process formulation used, to include formulation density, monomer and non-monomer VOC content by weight, individual HAP content by weight, total HAP content by weight, solids content by weight and other information necessary to demonstrate compliance with Table 2.
4	9. The Permittee shall maintain a monthly record of acetone used, by weight.
	10. The Permittee shall maintain a monthly record of any VOC or HAP containing cleaning materials used, to include VOC and/or HAP content, by weight.
Facility-wide	11. The Permittee shall maintain adequate records on-site to demonstrate compliance with all operational, production, and emission limits contained in Table 2 above. Records shall also include the actual emissions of air contaminant(s) emitted for each calendar month and for each consecutive twelve month period (current month plus prior eleven months). These records shall be compiled no later than the 15th day following each month. An electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, can be downloaded at http://www.mass.gov/dep/air/approvals/aqforms.htm#report .
	12. The Permittee shall maintain records of monitoring and testing as required by Table 3.
	13. The Permittee shall maintain a copy of this Plan Approval, underlying Application and the most up-to-date SOMP for the EU(s) approved herein on-site.
	14. The Permittee shall maintain a record of routine maintenance activities performed on the approved EU(s), PCD(s) and monitoring equipment. The records shall include, at a minimum, the type or a description of the maintenance performed and the date and time the work was completed.
	15. The Permittee shall maintain a record of all malfunctions affecting air contaminant emission rates on the approved EU(s) and monitoring equipment. At a minimum, the records shall include: date and time the malfunction occurred; description of the malfunction; corrective actions taken; the date and time corrective actions were initiated and completed; and the date and time emission rates and monitoring equipment returned to compliant operation.
	16. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	17. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years.

Table 4	
EU#	**Record Keeping Requirements**
	18. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.

Table 4 Key:
CMR = Code of Massachusetts Regulations
EU# = Emission Unit Number
HAP = Hazardous Air Pollutant(s)
LRTM = Light Resin Transfer Molding
MassDEP = tons per month
PCD = Pollution Control Device
SCRIMP™ = Seemann Composites Resin Infusion Molding Process
SOMP = Standard Operating and Maintenance Procedure
USEPA = United States Environmental Protection Agency
VOC = Volatile Organic Compound(s)

Table 5	
EU#	**Reporting Requirements**
Facility-wide	1. The Permittee shall submit to MassDEP all information required by this Plan Approval over the signature of a "Responsible Official" as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c).
	2. The Permittee shall notify the Southeast Regional Office of MassDEP, BAW C&E Chief by telephone 508-946-2817, or fax 508-947-6557, as soon as possible, but no later than three (3) business days after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to BAW C&E Chief at MassDEP within ten (10) business days thereafter and shall include: identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s).
	3. The Permittee shall report to MassDEP, in accordance with 310 CMR 7.12, all information as required by the Source Registration/Emission Statement Form. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require Plan Approval.
	4. The Permittee shall provide a copy to MassDEP of any record required to be maintained by this Plan Approval within 30-days from MassDEP's request.
	5. The Permittee shall submit to MassDEP for approval a stack emission pretest protocol, at least 30 days prior to emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.
	6. The Permittee shall submit to MassDEP a final stack emission test results report, within 45 days after emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.

Table 5 Key:
BAW = Bureau of Air and Waste
C&E = Compliance and Enforcement
CMR = Code of Massachusetts Regulations
EU# = Emission Unit Number
MassDEP = Massachusetts Department of Environmental Protection

4. SPECIAL TERMS AND CONDITIONS

The Permittee is subject to, and shall comply with, the following special terms and conditions:

A. The Permittee shall comply with the Special Terms and Conditions as contained in Table 6 below:

Table 6

EU#	Special Terms and Conditions
1, 2, 3	1.

Operation / activity		Max VOC or HAP [Note 1] content	Emission Factor
Epoxy Blade Production	Epoxy primer	9.5 lbs solvent [Note 2]/gal solids, as applied	100%
	Polyurethane coating	9.5 lbs solvent [Note 2]/ gal solids, as applied	100%
	Thinner	100%	100%
	Developmental epoxy related activities	100%	100%
PE, Fiber Glass or other	Solvents	100%	100%
	Resin, open molding	50% (wt)	See Table 6, provision No. 2.c.
	Resin – closed, SCRIMP™	50% (wt)	0.005 * wt % HAP or VOC [Note 3]
	Resin – closed, LRTM	50% (wt)	0.02 * wt % HAP or VOC [Note 4]
	Gelcoat, open molding	48% (wt)	See Table 6, provision No. 2.a. and 2.b.
	Catalysts	100%	100%
General	paints & adhesives	9.3 lbs solvent [Note 2]/ gal solids, as applied	100%
	Developmental paints & adhesives	100%	100%

Notes:

1. Total HAP and maximum single HAP.
2. "Solvent" refers to VOC and HAP
3. SCRIMP™ closed molding emission factor based on a previously approved 0.5% of the VOC or HAP contained in the material.
4. LRTM closed molding emission factor based on 2% of the VOC or HAP contained in the material as published by the South Coast AQMD.

Table 6

EU#	Special Terms and Conditions
1, 2, 3	2. Except as noted below emission factors in provision No. 1 above are based on 100% of the VOC or HAP contained in the material. Gelcoat and open molding are calculated using the methodology detailed in "Guidelines for Calculating Emissions from Polyester Resin Operations (South Coast AQMD, June 2007)" and 40 CFR 63, Subpart WWWW "National Emissions Standards for Hazardous Air Pollutants: Reinforced Plastic Composites Production." The approved Facility **is not** subject to 40 CFR 63 Subpart WWWW. a. <u>Gelcoat emission factor(s) without Methyl Methacrylate (MMA)</u>: i. Materials with less than 33% styrene = (0.445 * wt % styrene) ii. Materials with 33% or greater styrene = [(1.03646 * wt % styrene) – 0.195] b. <u>Gelcoat emission factor(s) with Methyl Methacrylate (MMA)</u>: i. Materials with less than 33% styrene = (0.445 * wt % styrene) + [0.75 * wt% MMA] ii. Materials with 33% or greater styrene = [(1.03646 * wt % styrene) – 0.195 + [0.75 * wt% MMA] c. <u>Open molding emission factor(s)</u>: i. Materials with less than 33% VOC or organic HAP = 0.126* wt % HAP or VOC ii. Materials with 33% or greater VOC or organic HAP =[(0.286 * wt % HAP or VOC) – 0.0529] d. <u>SCRIMP™ closed molding emission factor</u> based on a previously approved 0.5% of the VOC or HAP contained in the material. e. <u>LRTM closed molding emission factor</u> based on 2% of the VOC or HAP contained in the material as published by the South Coast AQMD.
1, 2, 3	3. The Permittee will limit the use of materials containing VOC and HAP in accordance with Table 2 and Table 6, provision 1 and provision 2. This represents an alternative approach for compliance when operations or production limitations on a source are not feasible due to production or materials variability. The limitations consist of emissions formulas, which when implemented, preserve the practical enforceability requirements necessary to limit the Facility's potential to emit. These emission formulas establish emission limitations that can easily be verified with information managed in the Facility's business operations. Additionally, these formulas set out the methodology by which emissions from various process materials will be determined. These formulas determine emissions in a replicable manner by replacing the pollutant species and the associated emissions.
3	4. Most paint will be applied with a roller or brush. Any spray application of coatings at the Facility shall be done using "High Volume Low Pressure" (HVLP) or other coating application method that achieves a transfer efficiency equivalent to HVLP spray application and is approved by the Department in writing. Based on the large size of the wind turbine blades, a spray booth will not be used. Any future products that can reasonably be coated in a spray booth shall use such. Any spray booth used at the Facility shall be designed and operated in a manner consistent with Department Regulation 310 CMR 7.03(16), exclusive of coating formulation requirements.
	5. The Permittee is subject to requirements at 310 CMR 7.18(30) <u>Adhesives and Sealants</u>. In accordance with 310 CMR 7.18(30)(a)1.c., 310 CMR 7.18(30) applies to any person who, on or after May 1, 2016, uses, applies, or solicits the use or application of any adhesive, sealant, adhesive primer, or sealant primer in Massachusetts.

Table 6	
EU#	**Special Terms and Conditions**
Facility-wide	6. In addition to the limits contained elsewhere in this Approval, the Permittee shall limit opacity to 0%, exclusive of uncombined water vapor.
	7. The Permittee shall ensure the proper storage, handling and disposal of VOC, HAP, and Acetone containing materials to reduce evaporative losses and maintain good operating practices.
	8. The Permittee may reconcile the VOC, HAP, and acetone contained in any hazardous waste shipped during the month when determining monthly emissions. The Facility shall maintain beginning and end of year inventory records, hazardous waste disposal records, and purchase records for VOC, HAP, and acetone containing materials, etc, such that the MassDEP may check these for consistency with plant logs. Such records shall verify the VOCs and the quantity present, in the waste being shipped if reconciling monthly emissions.
	9. The Permittee has determined that the Facility is not subject to USEPA Regulation 40 CFR 63, Subpart HHHHHH – "National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources." Accordingly, the Facility shall not conduct any paint stripping operations that involve the use of chemical strippers that contain methylene chloride (MeCl), Chemical Abstract Service number 75092, in paint removal processes. Additionally, the Facility shall not conduct spray application of coatings containing compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd), to any part or product made of metal or plastic[1].
Facility-wide	10. This Approval letter shall supersede Plan Approval No. 4P10025. The underlying application, as submitted under Transmittal No. X233993 and approved on November 16, 2010, shall remain in effect.

Table 6 Key:
AQMD = Air Quality Management District
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
USEPA = United States Environmental Protection Agency
EU# = Emission Unit Number
HAP = Hazardous Air Pollutant(s)
gal = gallon(s)
LRTM = Light Resin Transfer Molding
N/A = not applicable
No. = Number
PCD = Pollution Control Device
lbs = Pounds
SCRIMP™ = Seemann Composites Resin Infusion Molding Process
VOC = Volatile Organic Compound(s)
wt = weight
% = percent

B. The Permittee shall install and use an exhaust stack, as required in Table 7, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. Each exhaust stack shall be configured to discharge the gases vertically and shall not be equipped with any part or device that restricts the vertical exhaust flow of the emitted gases, including but not limited to rain protection devices known as "shanty caps" and "egg beaters." The Permittee

[1] Refer to 40 CFR 63, Subpart HHHHHH for the definition of "plastic" as it applies to this subpart.

shall install and utilize exhaust stacks with the following parameters, as contained in Table 7 below, for the Emission Units that are regulated by this Plan Approval:

Table 7

EU#	Stack Height Above Ground (feet)	Stack Inside Exit Dimensions	Stack Gas Exit Velocity Range (feet per second)	Stack Gas Exit Temperature Range (^{o}F)
1,2,3,4	g.v.	N/A	N/A	N/A

Table 7 Key:
EU# = Emission Unit Number
^{o}F = Degree Fahrenheit
g.v. = general ventilation
N/A = Not Applicable

5. GENERAL CONDITIONS

The Permittee is subject to, and shall comply with, the following general conditions:

A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).

B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.

C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.

D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.

E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local regulations now or in the future.

F. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.

G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.

H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.

I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.

J. The Permittee shall conduct emission testing, if requested by MassDEP, in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13. If required, a pretest protocol report shall be submitted to MassDEP at least 30 days prior to emission testing and the final test results report shall be submitted within 45 days after emission testing.

K. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain "Fail-Safe Provisions," which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

7. APPEAL PROCESS

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing-filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Peter Russell by telephone at 508-946-2821, or in writing at the letterhead address.

Sincerely,

_____

Thomas Cushing
Air Quality Permit Chief
Bureau of Air and Waste

Enclosure

ecc: Fall River Dept of Health
Fall River Fire Department
David Lloyd, TPI Composites
Brendan Ayer, Ayer Quality Engineering
MassDEP/Boston - Yi Tian
MassDEP/SERO – Maria Pinaud, Peter Russell